

# Mental health problems and hypertension in the elderly: Review from the HOPE Asia Network

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## Abstract

The “triple burden” of aging population, hypertension, and mental health problems making elderly in Asia is more vulnerable. There is evidence of a bidirectional relationship between mental health and hypertension, which results in lower quality of life, lower rate of treatment adherence, and higher mortality among elderly individuals. It is essential to overcome known barriers and care for the elderly with high-risk factors in order to address these burdens. This review revealed that elderly with hypertension were more likely to suffer from depression and anxiety. Therefore, debunking myths, creating awareness regarding mental health, and increasing access to mental health

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resources through holistic community-based programs would greatly reduce such problems and optimize the chances of success in controlling hypertension-related problems.

## 1 | INTRODUCTION

The World Health Organization (WHO) defines health as “A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.” The elderly, who account for more than 700 million individuals in the global population, are at higher risk of hypertension (67%) and mental disorders (15%).<sup>1-4</sup>

Increased life expectancy does not always signify an improvement in the quality of life. On the contrary, the elderly might occasionally experience a compromised and poor quality of life. Studies have reported both direct and indirect correlation between physical and mental health.<sup>4-6</sup> According to the WHO, South-East Asia has the highest number of cases of depressive and anxiety disorders compared to other regions, accounting for 7.2% and 2.8% of all Years Lived with Disability (YLD), respectively.<sup>7</sup> In addition, several national reports from Asia have demonstrated that hypertension, depression, and anxiety disorders occur predominantly in older adults.<sup>8</sup> Therefore, the elderly, especially in Asia, are vulnerable to the burden of hypertension and mental health problems (Table 1).

## 2 | MENTAL HEALTH PROBLEMS IN ASIA

Asia has the world's largest population and is a diverse continent; therefore, mental health problems vary between countries. Despite Western transformation in some Asian cultures and modernization of evidence-based medicine, there are several myths and false practices, both in rural and urban areas. Some of these are illnesses as a result of supernatural phenomena such as demonic possession, punishment by god due to past and current sins or other spiritual causes, false perception that mental illness is an untreatable condition, and the wrong practice of restraining people with mental illnesses by considering them worthless.<sup>47-49</sup>

Mental health problems among individuals in Asia are more complicated than in the West. Asians have more cultural barriers such as stigma and discrimination, false beliefs, poor health literacy; and structural barriers such as poor personal and financial resources, which prevent people from seeking help from mental health professionals.<sup>50-52</sup>

## 3 | MENTAL HEALTH PROBLEMS AND CARDIOVASCULAR DISEASES

Depressive disorders are associated with cardiovascular disease (CVD) and poor long-term outcomes.<sup>53,54</sup> Depression could significantly increase the risk of stroke-related morbidity and mortality, independent of other risk factors such as hypertension and

diabetes.<sup>55,56</sup> This finding was consistent across subgroups, wherein the estimated absolute risk differences associated with depression were 106 cases of total stroke, 53 cases of ischemic stroke, and 22 cases of fatal stroke per 100,000 individuals per year.<sup>55</sup> Jackson *et al* also found that adults with high levels of anxiety and depression had a 30% and 44% greater risk of heart attack and stroke, respectively.<sup>57</sup> Anxiety, as a sign of poor emotional regulation, increases the risk of cardiac events and mortality.<sup>58</sup> Another study showed that women who had experienced significant psychological distress had a higher incidence of CVD, and this association was not observed in men.<sup>59</sup> However, the Japan Morning Surge Home Blood Pressure (J-HOP) study found an association between depression and cardiovascular events among men as they tended to have higher blood pressure and were more likely to experience asymptomatic target organ damage.<sup>54</sup>

Arup *et al* reported that major depressive disorder, which causes dysregulation of the sympathetic nervous system and the hypothalamic-hypophysis-adrenal axis, increases the risk of ventricular arrhythmia and myocardial infarction. Proposed mechanisms included hypertension, left ventricular hypertrophy, coronary vasoconstriction, endothelial dysfunction, thrombocyte activation, and pro-inflammatory cytokine production.<sup>60</sup> Poor lifestyle associated with depressive disorders can also be a possible underlying pathogenetic mechanism of stroke.<sup>56</sup>

## 4 | DEPRESSION, ANXIETY, AND HYPERTENSION

Depression and anxiety are the most common mental disorders associated with various symptoms, ranging from mild to severe.<sup>7</sup> The association between depression and hypertension remains controversial.<sup>61</sup> Shin and Hwang did not report any difference between depressed and normal subjects.<sup>35</sup> Previous studies have reported that depressive symptoms were associated with low blood pressure and that the blood pressure was found to be lower in hypertensive participants who were not on antihypertensive medication.<sup>62-64</sup> There is evidence of a bidirectional relationship between depression and hypertension, which results in lower quality of life, lower rate of treatment adherence, and higher mortality among elderly individuals with hypertension.<sup>61,65-67</sup> Moreover, a non-randomized study showed that hypertensive patients with depressive symptoms required more antihypertensive drugs to achieve good control of their home blood pressure.<sup>68</sup>

A study conducted in Spain showed that moderate/severe (but not mild) hypertension was closely related to depression.<sup>69</sup> Other studies have reported a positive correlation between hypertension and depression wherein, depression increased the risk of

**TABLE 1** Proportion of elderly individuals, and prevalence of hypertension and depressive and anxiety disorders in HOPE Asia Network countries

Country	Proportion of the elderly in 2019 <sup>a</sup> , %	Hypertension prevalence in the elderly, %	Depressive disorders in the elderly, %	Anxiety disorders in the elderly, %	Life expectancy in 2018, years	Reference
China	11.5	65-74: 55.7 75+: 60.2	3.86-13.01	41	76.4	9-14
Hong Kong	17.5	64.8	4.7	5.5	Men: 82 Women: 88	9,10,15-18
India	6.4	40.5	21.9	10.8	68.8	9,10,19-21
Indonesia	6.1	65-74: 63.2 75+: 69.5	65-74: 8 75+: 8.9	65-74: 12.8 75+: 15.8	69.3	8-10
Japan	28.0	65-74: 66.8 75+: 78.1	1.2	1.1	84.2	10,22,23
Malaysia	6.9	70-74: 75.4	16.5	3.6-38	75.3	9,10,24-27
Pakistan	4.3	60-69: 76.7	22.9	N/A	66.5	9,10,28,29
Philippines	5.3	81.5	6.6	N/A	69.3	9,10,30,31
Singapore	12.4	73.9	3.7	15.5	82.9	9,10,32-34
South Korea	15.1	60-69: 51.8 70+: 67.5	29.8-38.1	6-36.7	82.7	9,10,35-37
Taiwan	14.4	65-74: 53.2 75+: 73.3	13.3	N/A	80.2	9,38-41
Thailand	12.4	16.7-47.2	23.7	6.4	75.5	9,10,42,43
Vietnam	7.6	65-74: 56.2 75+: 69.8	66.9 (urban)	N/A	76.3	9,10,44-46

<sup>a</sup>Elderly ages 65 and above according to 2019 World Population Prospect World Bank.<sup>9</sup>

hypertension and cerebrovascular disease, and in turn, hypertension increased the severity of depression.<sup>70-72</sup> Apart from factors such as genetics, hyperactivity of the sympathetic nervous system, and use of anti-depressants, Kuo and Pu hypothesized that simultaneous effects of hypertension and depression could increase mortality.<sup>65,72</sup> Kayano *et al* also found higher variations in blood pressure of patients with depression.<sup>73</sup> Furthermore, patients with masked hypertension also had a higher risk of depression compared to those with controlled hypertension.<sup>73</sup> The results of this study complement those of a Mexican study on individuals with depressive disorders, which showed an increased risk of uncontrolled hypertension possibly due to loss of interest and subsequent lower adherence to treatment.<sup>74</sup>

A cross-sectional study conducted in Andkhoy showed that hypertensive patients who were old, women, smokers, and diabetic were more likely to be associated with anxiety.<sup>71</sup> Hypertension—white-coat hypertension, nocturnal and morning blood pressure surge—was also found to be associated with anxiety through disruption of the autonomic nervous system, leading to higher variations in blood pressure and cardiovascular events.<sup>61,75-77</sup> Estrogen may weaken the neurohormonal mediators that cause non-dipping pattern of nocturnal blood pressure; therefore, depressive symptoms and non-dipping of nocturnal blood pressure are less likely to occur in women.<sup>78</sup> The HOPE Asia Network study reported a high prevalence of white-coat hypertension (28%).<sup>79</sup> Research has also reported that elderly patients were more likely to be anxious, thus demonstrating an increase in blood pressure and white-coat hypertension. For example, differences in results might have been influenced by the anxiety related to measurements being recorded by the doctors or nurses.<sup>80</sup> Another study in Japan found that awake systolic blood pressure and pulse rate correlated with anxiety in women, while diurnal blood pressure variation was associated with working men who suffered from depression.<sup>78</sup>

Loneliness is associated with an increased risk of developing coronary heart disease and stroke. People with poor social relationships

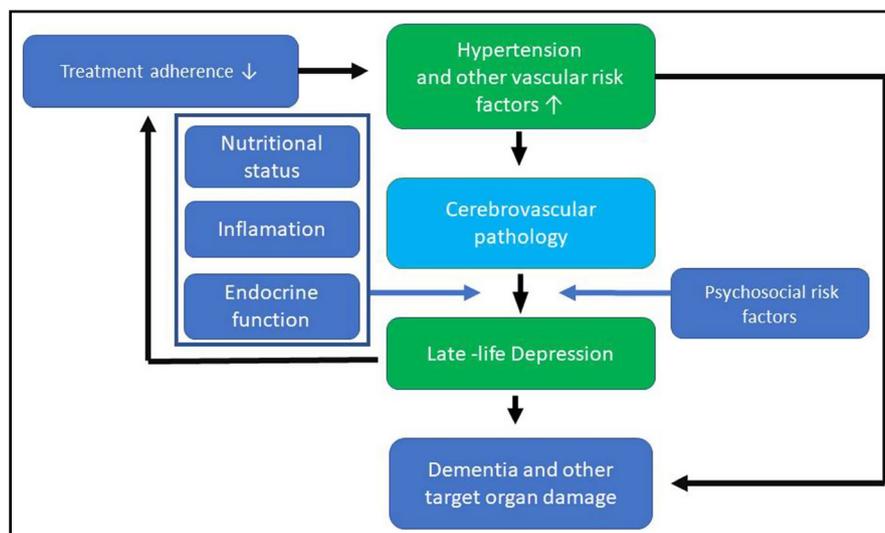
have a 29% and 32% higher risk of developing coronary heart disease and stroke, respectively.<sup>81,82</sup> A study reported that assessment of loneliness at the beginning of the study could predict the increment in systolic blood pressure in the second, third, and fourth years ( $B = 0.152$ ,  $SE = 0.091$ ,  $P < .05$ , one-tailed).<sup>83</sup> This cumulative increase suggested that higher initial levels of loneliness were associated with a greater increment in systolic blood pressure over the study period of four years.<sup>83</sup> Association between loneliness and CVD remained significant after controlling for biological and behavioral CVD risk factors, such as depression, anxiety, self-esteem, and other behaviors such as alcohol consumption and physical activity, suggesting a psychological pathway.<sup>81</sup>

## 5 | HYPERTENSION, CEREBROVASCULAR PATHOLOGY, AND LATE-LIFE DEPRESSION

Depression in the elderly, or referred to as late-life depression (LLD), commonly defined as any depressive episode occurring at age 65 or later, regardless of the age of onset.<sup>84</sup> The LLD is a heterogeneous condition with different etiologies, where genetics mostly influence early life and psychosocial contributes to later life.<sup>85</sup> Biological factors of LLD include cerebrovascular pathology, disorders of the endocrine system, presence of inflammatory processes, and nutritional status.<sup>85</sup> (Figure 1.)

In contrast to depressive disorders in young adults, LLD is associated with cerebrovascular comorbidities, so-called vascular depression.<sup>84</sup> Cerebrovascular pathology—such as white matter lesions—is strongly associated with hypertension as a risk factor.<sup>85,86</sup>

A review by Baldwin RC, *et al* shows a close relationship between brain vascular disorders with mental health, especially depression; for example, depressions are more prominent in vascular dementia than Alzheimer's dementia. Patient with cerebrovascular disease, especially in anterior hemisphere lesions, often experiencing liability



**FIGURE 1** The biopsychosocial relationship between hypertension and depression

of the mood; on the other hand, silent stroke also mainly present in people with depression.<sup>87</sup>

The development of neuroimaging techniques showed the bidirectional association between LLD with the cerebrovascular disease—measured as white matter hyperintensity (WMH) burden—and treatment responsiveness.<sup>88</sup> WMH histopathology studies reflect myelin damage and fluid accumulation among other underlying pathology. WMHs are associated with lower white matter microstructural integrity and altered brain function.<sup>89</sup> Other pathological features in poststroke depressed patients are gray matter loss, subcortical lacunes, microinfarcts and microbleeds, frontal and temporal (hippocampal) gray matter changes/atrophy, neurodegenerative pathologies, and related biochemical changes.<sup>88,89</sup>

## 6 | DEPRESSION AND MEDICAL ADHERENCE TO ANTIHYPERTENSIVE TREATMENT

Providers should assess treatment adherence, treatment recommendations for comorbid diseases, and identify depression in evaluating antihypertensive medications in patients with uncontrolled

blood pressure.<sup>90</sup> Hypertension can cause pathological disorders in the brain with depressive symptoms; causing patients do not comply with treatment, resulting in uncontrolled hypertension, adding more risk to vascular disorders in the brain and more severe depression. (Figure 1) Hypertensive patients present with other chronic diseases may experience profound emotions which increase their risk for mental health disorders. Management of negative emotions that can influence adherence to therapies are important in the hypertension management.<sup>91</sup> Detection of depression in hypertensive patients would facilitate management of depression, resulting in improve medication adherence, depressive symptoms, and blood pressure control in those patients with both chronic illnesses.<sup>90</sup>

Drawing a causal relationship between anxiety, depression, and stress in hypertension may be difficult; but, overlooking the association may further increase the burden of medication nonadherence.<sup>91</sup> Poor adherence to antihypertensive medications remains a significant challenge in the management of patients with hypertension. It has many serious effects on the prognosis of the illness and overall effectiveness of the health system. Nonadherence may signal that the patient and physician have different goals and priorities regarding the treatment and its schedule.<sup>92</sup>

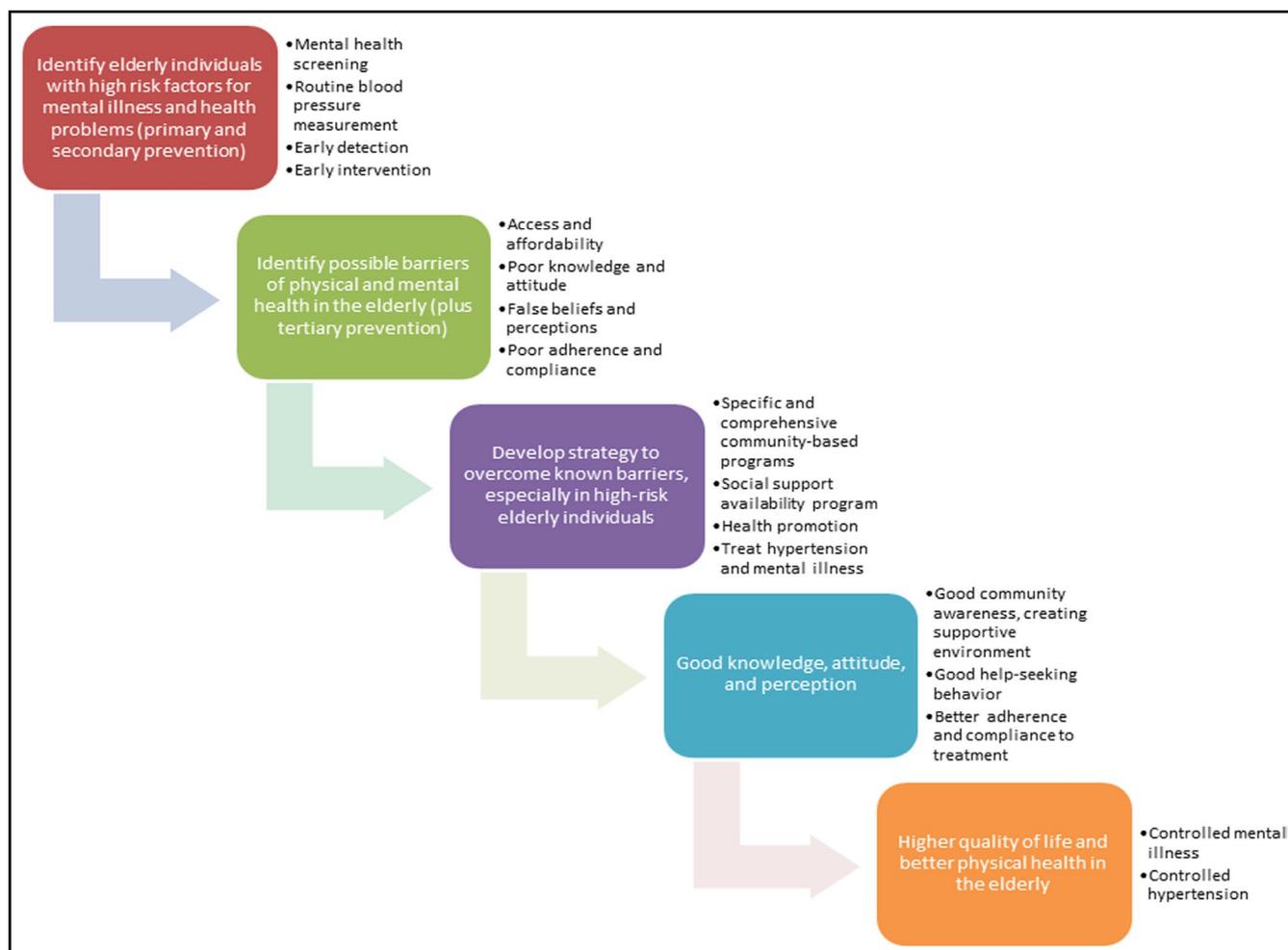


FIGURE 2 Overcoming the “triple burden” in Asia program

Depressive disorder in the elderly appears to be linked with self-efficacy, which can be influenced by employment or physical functions, such as sight, hearing, and chewing. In a study performed in South Korea, where the prevalence of depressive disorder and nonadherence was 29.8% and 60%, respectively, worse adherence to medication was independently associated with depressive disorder. However, this association was primarily mediated by self-efficacy. Considering that depression and self-efficacy are the essential components associated with motivation for medication adherence, a more systematic approach would be required to resolve these barriers to improve control of hypertension in the elderly.<sup>93</sup>

## 7 | OVERCOMING THE “TRIPLE BURDEN” IN ASIA

The term of “triple burden” we meant is characterized by the coexistence of being elderly, along with hypertension and mental health problems (Figure 1). According to Age Concern and the Mental Health Foundation, the five key factors affecting mental health in the elderly are discrimination, meaningful participation, relationship, physical health, and poverty.<sup>94</sup> Known risk factors for this burden include age >80 years, female sex, being unmarried and living alone, low income, living in rural areas, frailty and low functional status, cognitive decline, poor family functioning, poor sleep quality, illiteracy, as well as stressful life events such as death of partner in the past two years, and recent separation, retirement, unemployment, and history of health problems or disability.<sup>24,61,70,95-98</sup> Diet restriction, such as spiritual fasting and physical activity, were found to be protective factors in patients with depressive disorders.<sup>24,46</sup>

In addition, a systematic review conducted by Shi *et al* reported the possible barriers to help-seeking behavior in people with mental illnesses as follows: 1) seeking help from alternative sources, 2) misconception, 3) self-reliance and unwillingness to seek help, 4) low perceived need, 5) fear of stigma, 6) negative experiences and attitude toward treatments, 7) affordability and accessibility, 8) family opposition, 9) sociodemographic barriers, and 10) inability to recognize mental illness.<sup>99</sup>

It is important to overcome known barriers and care for the elderly with high-risk factors in order to address the “triple burden” (Figure 2). Screening individuals and promoting mental health awareness is important to reduce stigma, specifically among those living in rural areas. Furthermore, favorable attitude of physicians toward hypertensive patients with depressive symptoms and availability of social support are important to combat depressive disorders in the community and increase the treatment adherence.<sup>54,68,74,92,100-102</sup>

## 8 | CONCLUSION

Mental health problems are strongly correlated with the success of hypertension management strategies. People with hypertension are more likely to suffer from depression and anxiety. Therefore,

increasing awareness in the population regarding mental health and increasing access to mental health resources through concrete community-based programs would greatly reduce such problems and optimize the chances of success in controlling hypertension-related problems.

### DISCLOSURE

YC Chia has received speakers' honorarium and sponsorship to attend conferences and CME seminars from Abbott, Bayer, Boehringer Ingelheim Pharmaceuticals, GlaxoSmithKline, Menarini, Merck Sharp & Dohme, Novartis, Omron, Pfizer, and Sanofi and Xepa-Soul Pattinson, and a research grant from Pfizer Inc J Shin has received lecture honoraria from Pfizer Inc, Hanmi Pharm. Co. Ltd., Yuhan Co. Ltd., Boryung Pharmaceutical Co. Ltd., consulting fees from Hanmi Pharm. Co. Ltd., and research grants from Sanofi Pharm. and Hanmi Pharm. Co. Ltd. CH Chen reports personal fees from Novartis, Sanofi, Daiichi Sankyo, Servier, and Boehringer Ingelheim Pharmaceuticals Inc S Park has received honoraria from Pfizer Inc, Daiichi Sankyo, Takeda Pharmaceuticals International, Daewon Pharmaceutical Company, Boryung Pharmaceutical Company, and Servier. S Park has also received a research grant from Daiichi Sankyo. S Siddique has received honoraria from Bayer, Novartis, Pfizer Inc, ICI, and Servier, and travel, accommodation, and conference registration support from Hilton Pharma, Atco Pharmaceutical, Highnoon Laboratories, Horizon Pharma, and ICI. HM Cheng has received speakers' honorarium and sponsorship to attend conferences and CME seminars from Eli Lilly and AstraZeneca; Pfizer Inc, Bayer AG, Boehringer Ingelheim Pharmaceuticals Inc, Daiichi Sankyo, Novartis Pharmaceuticals Inc Servier, Sanofi, and Takeda Pharmaceuticals International, and has served as an advisor or consultant for ApoDx Technology Inc K Kario received a research grant from MSD K.K, Astellas Pharma Inc, Eisai Co., Otsuka Pharmaceutical Co., Sanwa Kagaku Kenkyusho Co., Daiichi Sankyo Co., Taisho Pharmaceutical Co., Ltd., Sumitomo Dainippon Pharma Co., Takeda Pharmaceutical Co., Teijin Pharma, Boehringer Ingelheim Japan Inc, Bristol-Myers Squibb K.K, and Mochida Pharmaceutical Co. Ltd., and honoraria from Daiichi Sankyo Co. Ltd. and Mylan EPD. All other authors report no potential conflicts of interest in relation to this article.

### AUTHOR CONTRIBUTIONS

Manuscript title: Mental health problems and hypertension in the elderly: Review from the HOPE Asia Network. Yuda Turana involved in conception and design of study, data analysis and/or interpretation, drafting and/or critical revision of manuscript, and approval of final version of manuscript. Jeslyn Tenglawan, Kazuomi Kario, and Yook Chin Chia involved in data analysis and/or interpretation, drafting and/or critical revision of manuscript, and approval of final version of manuscript. Jinho Shin, Chen-Huan Chen, Sungha Park, Kelvin Tsoi, Peera Buranakitjaroen, Arieska Ann Soenarta, Saulat Siddique, Hao-Min Cheng, Jam Chin Tay, Boon Wee Teo, and Tzung-Dau Wang involved in data analysis and/or interpretation, drafting and/or critical revision of manuscript.

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